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FLOOD INSURANCE STUDY



TOWNSHIP OF STANDISH,
MICHIGAN

ARENAC COUNTY



AUGUST 4, 1987



Federal Emergency Management Agency

COMMUNITY NUMBER - 260017

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**NOTICE TO
FLOOD INSURANCE STUDY USERS**

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY

TOWNSHIP OF STANDISH, ARENAC COUNTY, MICHIGAN

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Township of Standish, Arenac County, Michigan, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by Johnson and Anderson, Inc. (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-84-C-1614. This study was completed in December 1985.

1.3 Coordination

Streams and lakes requiring detailed study were identified at a meeting held in April 1984 and attended by representatives of the Study Contractor, FEMA, and the Township of Standish.

A subsequent coordination meeting was held in August 1985 between the Township Supervisor and the Study Contractor.

On September 25, 1986, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Township of Standish, Arenac County, Michigan. The area of study is shown on the Vicinity Map (Figure 1).

Flooding caused by overflow of the Saginaw Bay area of Lake Huron was studied in detail within the Township.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through December 1990. The scope and methods of study were proposed to and agreed upon by FEMA and the Township of Standish.

2.2 Community Description

The Township of Standish is located in southern Arenac County, 26 miles north of the City of Bay City in east-central Michigan. The community is bounded on the south by Pinconning Township in Bay County, on the west by Lincoln Township and the City of Standish, on the north by Arenac and Deep River Townships, and on the east by Saginaw Bay and Au Gres Township. The 1980 population was reported to be 2,011, an increase from the 1970 population of 1,493 (Reference 1).

The topography of Standish is generally flat, and soils are mostly sand and clay. These physiographic features are the product of glaciation and deposition of materials during the last glacial period.

Vegetation in the area is composed of grasses and trees native to the area. In addition, farms grow a variety of crops including beans, corn, sugar beets, and potatoes.

Lake Huron and Saginaw Bay provide a noticeable influence on the climate of Standish. Northeast winds may lower summer temperatures by 10 degrees Fahrenheit (°F) and raise minimum winter temperatures. The annual mean monthly temperature is 45.5 °F. Average annual precipitation is 27.8 inches, including the water equivalent of the average 42.5 inch annual snowfall (Reference 2).

Land use in Standish is primarily agricultural with some residential and scattered light commercial areas along major roads. Floodplain areas are predominantly farm land with some residential development.

2.3 Principal Flood Problems

The Saginaw Bay shoreline is subject to significant flooding caused by high water levels, wind generated lake setup, and waves. High water levels in March 1973, combined with a very strong northeast wind, caused extensive flooding along the entire Saginaw Bay coast, including the Township of Standish.

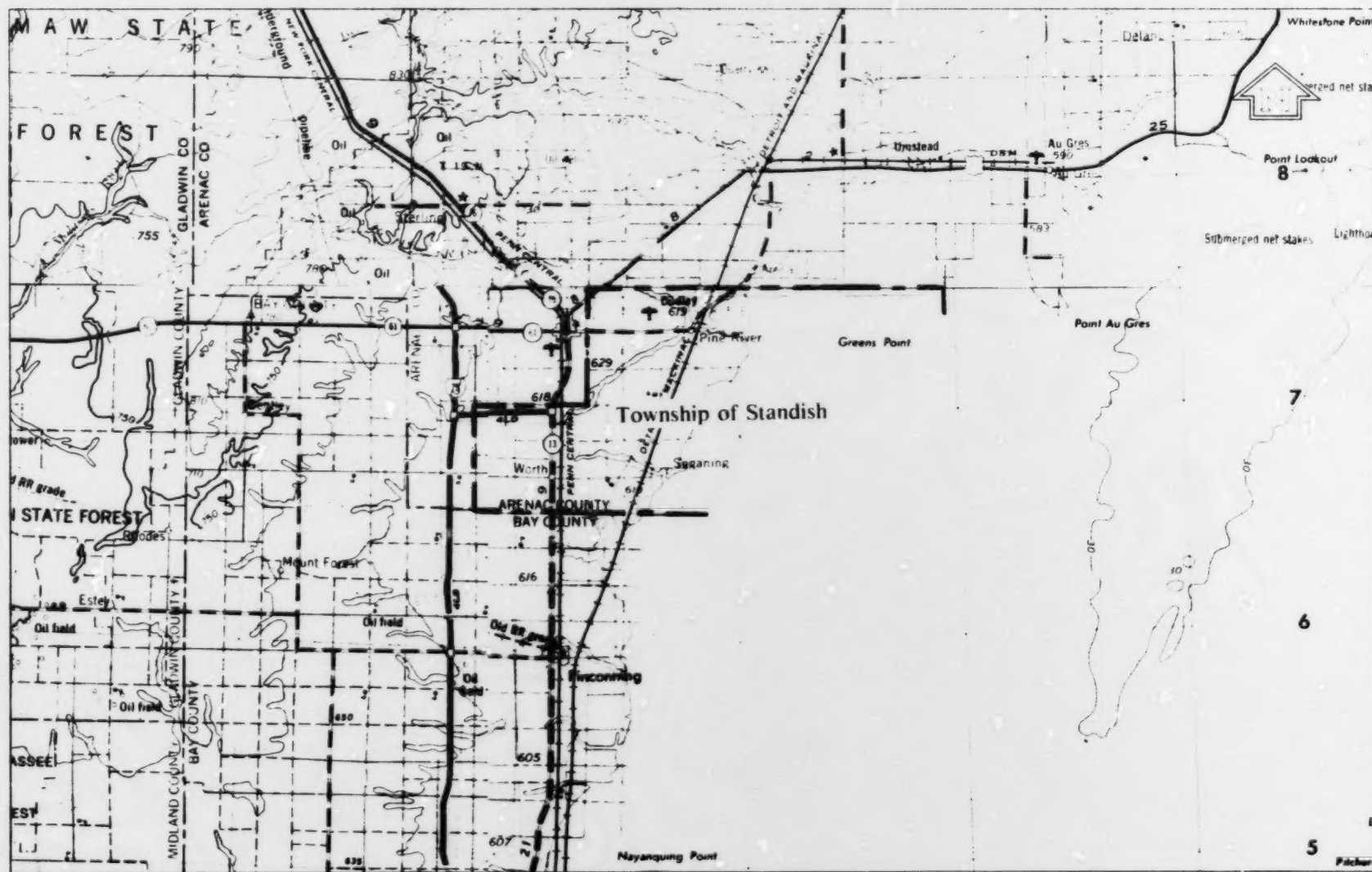


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF STANDISH, MI
(ARENAC CO.)

APPROXIMATE SCALE



VICINITY MAP

Great Lakes levels are affected by the following three categories of fluctuations: long-term, seasonal, and short-period. Long-term fluctuations are caused principally by an increase or decrease in precipitation over the entire Great Lakes Region. Flooding can occur along the shoreline when consecutive annual rainfalls are higher than the mean annual precipitation. In accordance with seasonal fluctuations, high lake levels would be expected to occur in the spring when runoff increased because of snowmelt and low rates of evaporation from the lake and evapotranspiration from the land surface. However, because of the sluggish hydrologic response of the large bodies of water involved, peak seasonal levels usually occur in July. Short-period fluctuations of lake levels can be caused by wind blowing over the lake. This wind drives surface water in great volumes toward the shore, thus raising the water level on one side of the lake while lowering the water level on the other side. The effect of this wind setup is more pronounced in areas with large expanses of off-shore shallow water, such as Saginaw Bay.

This study is primarily concerned with long-term fluctuations in combination with seasonal and short-period variations of the lake levels.

2.4 Flood Protection Measures

Flood protection measures are not known to exist within the study area.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic and Hydraulic Analyses

Hydrologic and hydraulic analyses were carried out to establish the peak elevation-frequency relationships for each flooding source studied in detail affecting the community.

The predicted flood elevations along Saginaw Bay were developed by analyzing historical gaging records at the City of Essexville, Michigan, and by using the U.S. Army Corps of Engineers 1977 "Report on Great Lakes Open Coast Flood Levels" (Reference 3). Individual gage records were

obtained through the National Oceanic and Atmospheric Administration, National Ocean Survey (Reference 4).

The Essexville Gage, at the mouth of the Saginaw River outlet to Saginaw Bay, was analyzed for adjacent Flood Insurance Studies in 1977 using 23 years of record (Reference 5). Both long-term, including seasonal, and short-term lake level fluctuations were considered when determining the final elevations.

The long-term lake level fluctuations were obtained from monthly gaging records at the Lake Huron master gage located in the City of Harbor Beach, Michigan. The monthly mean levels were adjusted for present diversion and inlet conditions affecting the Great Lakes system. The period of record used for the long-term elevation analysis included all months from 1915 through 1975. The adjusted levels were extended to Essexville through a linear regression analysis.

The maximum lake elevation at Essexville for each month for 23 years was used to establish the short-term cycles for Lake Huron at the south end of Saginaw Bay. The influence of seiching, wind tides, and storm surges were accounted for in the short-term cycles. Effects of individual waves were not included. Additional flood hazards due to wave runup should be considered, however, when planning future development.

Probabilities of long-term levels were combined with probabilities of short-term fluctuations to predict floods of selected recurrence intervals at Essexville. Flood elevations at the mouth of Saginaw Bay were obtained from "Report on Great Lakes Open Coast Flood Levels" (Reference 3). Elevations between the Essexville Gage and the Saginaw Bay mouth, a distance of about 36 miles, were established by straight line interpolation.

Elevations for floods of the selected recurrence intervals of the Saginaw Bay are shown in Table 1.

TABLE 1 - SUMMARY OF ELEVATIONS

<u>FLOODING SOURCE AND LOCATION</u>	<u>PEAK ELEVATION (FEET NGVD)</u>			
	<u>10-YEAR</u>	<u>50-YEAR</u>	<u>100-YEAR</u>	<u>500-YEAR</u>
SAGINAW BAY				
at Main Street Road	583.1	564.1	584.5	585.1
at Knickerbocker Road	583.3	584.4	584.7	585.4

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year

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floodplain boundaries to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each flooding source studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations. The boundaries were interpolated using topographic maps at scales of 1:9600 and 1:24000 derived photogrammetrically from aerial photographs (Reference 6).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE) and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary was delineated using the Flood Hazard Boundary Map for the Township of Standish (Reference 7).

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains used in the hydraulic analyses.

7.0 OTHER STUDIES

Flood Insurance Studies for the adjacent Townships of Pinconning and Deep River and the City of Standish have been published and are in agreement with this study (References 8-10).

A Flood Insurance Rate Map for the Township of Arenac has been printed and is also in agreement with this study (Reference 11).

Due to its more detailed analysis, this Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for the Township of Standish (Reference 7).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 300 South Wacker Drive, Chicago, Illinois 60606.

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9.0 REFERENCES AND BIBLIOGRAPHY

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5. Johnson & Anderson, Inc., Great Lakes Flood Elevations, Harrisville, Michigan, thru Toledo, Ohio, Drayton Plains, Michigan, unpublished report, January 1977.
6. Abrams Aerial Survey Corp., Aerial Photographs of Standish Township, Arenac County, Michigan, Scale 1:9600, 1:24000, March 1985.
7. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Township of Standish, Arenac County, Michigan, July 1976.
8. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Township of Pinconning, Bay County, Michigan, September 1978.
9. Federal Emergency Management Agency, Flood Insurance Study, Township of Deep River, Arenac County, Michigan, August 1985.
10. ———, Flood Insurance Study, City of Standish, Arenac County, Michigan, September 1985.
11. ———, Flood Insurance Rate Map, Township of Arenac, Arenac County, Michigan, July 1985.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0015	588.81	chiseled square in southeast wingwall of a concrete bridge over drain at northeast corner of intersection of Knickerbocker Road and Detroit and Mackinaw Railroad
2	0015	583.39	60d nail in south fence of a power pole located on west side of Sandy Drive 0.5 mile north of the intersection of Knickerbocker Road and Sandy Drive
3	0015	591.40	chiseled square in center of southwest headwall of concrete culvert at intersection of Detroit and Mackinaw Railroad and Mayette Road
4	0015	588.40	60d nail in southwest face of power pole located in northeast corner of intersection of Worth Road and paved road to north, 0.75 mile east of intersection of Foco Road and Worth Road
5	0015	582.72	chiseled cross in west end of southernmost metal pipe culvert located 75 feet north of intersection of Wenonah Drive and Point Street
6	0015	583.94	chiseled cross in south end of metal pipe culvert on west side of LaFava Road, 75 feet north of intersection of Whites Beach Road and La Fava Road
7	0015	582.69	chiseled cross in south end of metal pipe culvert located on west side of La Fava Road, 0.25 mile north of intersection of Whites Beach Road and La Fava Road
8	0005	585.42	60d nail in west face of a power pole located on west side of LaClair Road, about 1,000 feet north of intersection of Bordeau Road and LaClair Road
9	0005	585.00	60d nail in east face of power pole No. 214 located in southeast corner of intersection of Great Lakes Road and LaClair Road
10	0005	582.98	chiseled cross in south end of metal pipe culvert located at the southwest corner of intersection of Sagatou Road and LaClair Road

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ELEVATION REFERENCE MARKS (Continued)

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
11	0005	587.62	60d nail in east face of power pole located at southwest corner of intersection of LaClair Road and Irwin Road
12	0005	589.18	chiseled cross in east end of metal pipe culvert located at northeast corner of the intersection of LaClair Road and Palmer Road
13	0005	585.10	chiseled square in centerline of field bridge over ditch, 0.75 mile east of intersection of LaClair Road and Palmer Road
14	0010	584.73	60d nail in south face of twin 18-inch tree located on north edge of Palmer Road, 1.15 miles east of intersection of LaClair Road and Palmer Road
15	0010	584.32	60d nail in west face of 24-inch ash tree located 50 feet east of intersection of Pine River Road and Main Street Road
16	0010	588.19	railroad spike set flush in centerline of Main Street Road at entrance of field drive to the east, 0.5 mile north of intersection of Pine River Road and Main Street Road
17	0010	594.31	60d nail in north face of power pole located at southeast corner of intersection of Main Street Road and Langdon Road
18	0010	588.63	60d nail in north face of 25-inch cottonwood tree located on the southside of Langdon Road, 0.7 mile east of intersection of Main Street Road and Langdon Road
19	0010	586.05	60d nail located in southwest corner of intersection of Pine River Road and gravel road heading southwest, 0.4 mile west of Main Street Road